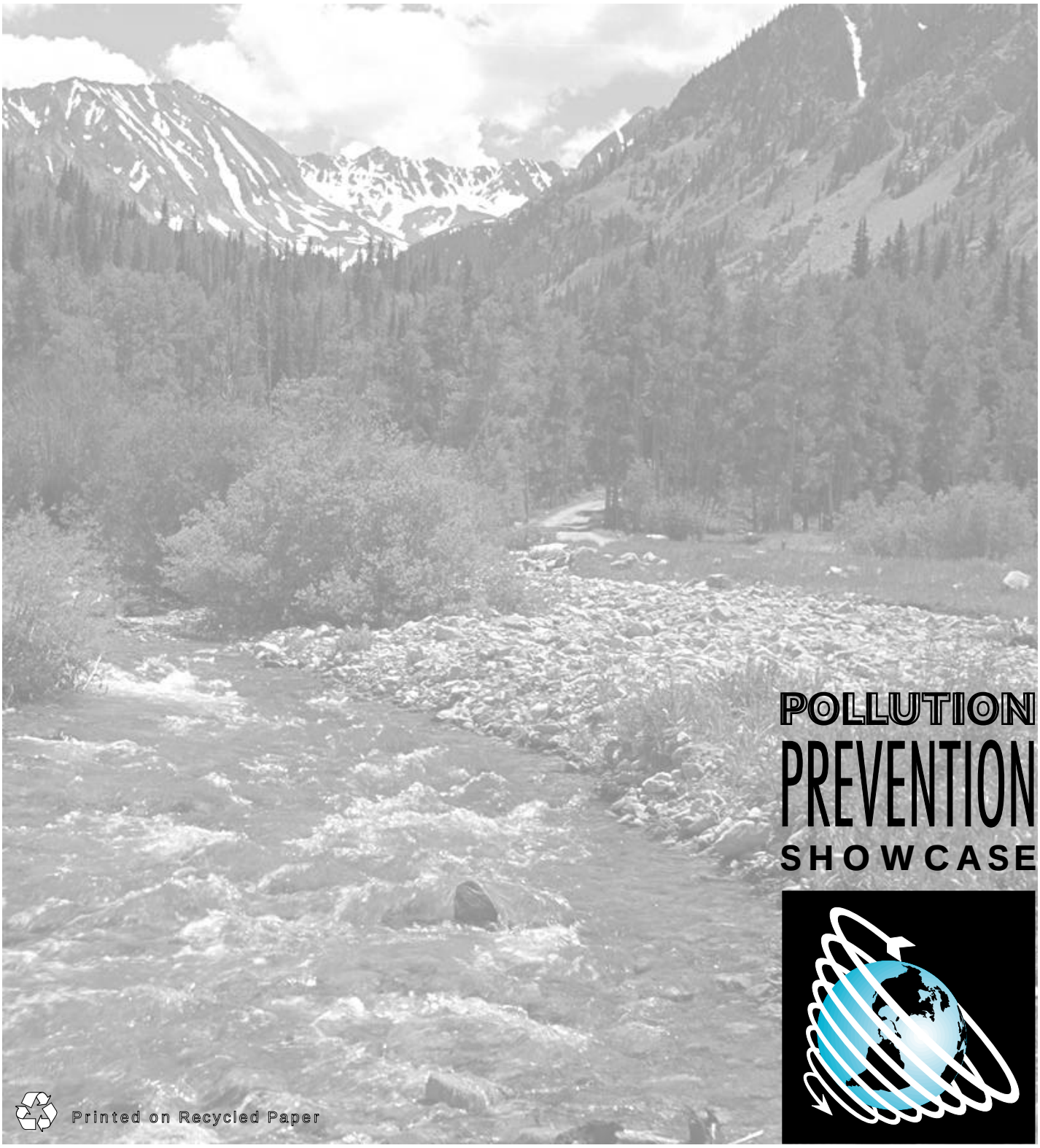

THE 1995

Los Alamos National Laboratory
Pollution Prevention Showcase
La Posada de Santa Fe
Santa Fe, New Mexico
January 16-18, 1995

Organized by the
Environmental Management
Pollution Prevention
Program Office

Los Alamos
NATIONAL LABORATORY

Dear Pollution Prevention Showcase Attendees:

On behalf of the Pollution Prevention Program Office and Los Alamos National Laboratory, I would like to welcome you to both the Pollution Prevention Showcase and Santa Fe, New Mexico. I am hopeful that you will learn a lot about Los Alamos National Laboratory waste minimization/ pollution prevention successes through this forum and glean useful information.

I hope your stay is enjoyable and that you are re-enthused about the field of pollution prevention, both by learning about LANL's diverse approaches and by talking with other attendees. Also, don't forget to take some time to enjoy Santa Fe!

Thank you for attending this showcase, and I hope that your attendance here and your stay in Santa Fe are both enjoyable.

Sincerely,

Micheline Devaurs
Pollution Prevention Program Office
Los Alamos National Laboratory

AGENDA
FOR
LANL POLLUTION PREVENTION SHOWCASE
TUESDAY, JANUARY 17, 1995

NOTE: EXHIBITS - NASON ROOM - OPEN ALL DAY

8:30 -10:30 - General Session - Abraham Room

8:30 - 8:45	Opening/Showcase Welcome	
8:45 - 9:15	New Mexico Environment Department Perspective	
9:15 - 9:45	Los Alamos National Laboratory Perspective	
9:45 -10:15	Keynote Speaker	
10:15 -10:30	BREAK	

10:30 - 3:45 - Paper Presentations - Abraham Room

10:30 -11:00	L. A. Worl	Magnetic Separation for Waste Minimization
11:00 - 11:30	T. Siverling	Chlorofluorocarbon Use and Future Elimination Plans at Los Alamos National Laboratory
11:30 - 12:00	S. Schreiber S. Yarbro	The ATLAS Facility: A Tool for Waste Management
12:00 - 1:30	LUNCH (On Your Own)	
1:30 - 2:00	J. Stimmel	Environmentally Friendly Metal Cleaning
2:00 - 2:30	C. Westerfield and	Design of a Novel Diamond Indentor to Aid
	S. Agnew	in the Study of Surface Films Associated with Wear Prevention
2:30 - 3 :00	E. Hyde	High Explosive Wastewater Minimization Alternative
3:00 - 3:15	BREAK	

3:15 - 3:45	M. West and G. Jacques	Shredding of Low-Level Waste at the Los Alamos National Laboratory Plutonium Facility—A Feasibility Study

TUESDAY, JANUARY 17, 1995 Continued

10:30 - 3:45 - Roundtable Discussions - Library

10:30 - 12:00	Recycling, Session Leader: J. Urioste
1:30 - 3:45	Environmental Restoration and Pollution Prevention/ Waste Minimization Session Leader: S. Hartnett
4:30 - 6:30	HOSTED EXHIBIT SESSION - NASON ROOM

LANL POLLUTION PREVENTION SHOWCASE
WEDNESDAY, JANUARY 18, 1995

NOTE: EXHIBITS - NASON ROOM - OPEN ALL DAY

8:30 - 4:15 - Paper Presentations - Abraham Room

8:30 - 9:00	M. Devaurs	Overview of Pollution Prevention Approach at Los Alamos
9:00 - 9:30	T. Mills	Nitric and Hydrochloric Acid Recovery and Recycle
9:30 - 10:00	H. Davis	Plasma Technologies for Hazardous Material Reduction
10:00 - 10:15	BREAK	
10:15 - 10:45	M. Brown	Johnson Controls Waste Awareness and Solutions Program
10:45 - 11:15	J. Foropoulos, Jr.	A Low Temperature Gas-Solid Process for the Destruction of Chlorocarbons
11:15 - 11:45	T. Nelson	Using Electrolytic Decontamination Methods for Pollution Prevention
11 :45 - 1 :30	LUNCH (On Your Own)	
1:30 - 2:00	M. Burns and L. Matysiak	Documentation of Waste Management Process and Development of Cost Estimation Model
2:00 - 2:30	W. Taylor	Waste Minimization in the Los Alamos Medical Radioisotope Program
2:30 - 3:00	J. Nielsen	ULISSES
3:00 - 3:15	BREAK	
3:15 - 3:45	P. Salaz	Waste Minimization for Photographic Process E-6
3:45 - 4:15	L. O'Brien	Portable Metal/Tritium Reclamation Unit

WEDNESDAY, JANUARY 18, 1994 Continued

8:30 - 4:15 -- Roundtable Discussions - Library

8:30 - 12:00	CFCs, Session Leaders: T. Siverling/J. Stimmel
1:30 - 4:15	Technologies, Session Leader: D. Christiansen/ J. Weinrach

END OF WORKSHOP

EXHIBITS

1.) ENVIRONMENTAL TECHNOLOGIES - S. Hayes

2.) JCI P^2 PROGRAM/SEAL - R. Perkins

3.) ELECTROLYTIC DECONTAMINATION OF CONDUCTIVE MATERIALS - T. Nelson

4.) POLLUTION PREVENTION PROGRAM OFFICE - H. Noskin

5.) NMT P^2 PROGRAM - D. Christiansen

6.) PLASMA SOURCE ION IMPLANTATION AND DECONTAMINATION- H. Davis

7.) PROCESS OPTIMIZATION AND EQUIPMENT/MATERIALS SUBSTITUTION FOR WASTE MINIMIZATION - P. Lopez

8.) WAND - C. Foxx, R. Hagan, J. Johnston

Johnson Controls
Waste Awareness and Solutions Program

M. Brown
Johnson Controls World Services, Inc.

Johnson Controls World Services has an active waste minimization, pollution prevention program. The WASP award is the official mechanism by which JCI employees will receive recognition for waste minimization and pollution prevention activities. The WASP award is composed of a three-tiered approach and is intended to recognize individuals and team efforts for suggestions and/or implemented projects in waste minimization. A committee of five individuals evaluates entries and selects winners every quarter. The first tier recognizes each entry submitted by the presentation of a certificate to each individual and recognition through an article in *Que Pasa.*

The top three individuals or teams with the highest scores for a quarter go to the second tier. In addition to the certificate each winner receives a specially designed pin in the shape of a wasp which is presented by the General Manager. The wasp logo was selected for “its minimal waist"“; JCI strives for minimal waste in its WM and PP activities. This level includes a luncheon where the presentations are made and entrants honored.

The final or third tier includes four prizes. Winners are selected from the last four quarters’ entries and are based on scores attained. Prize awards are made at a banquet where the first prize winner is honored with a trophy and a $500 travel or gift certificate.

JCI has already presented WASP awards to five employees for three separate successful projects. One team of two individuals recommended the recycling of solvent used in the testing of asphalt paving mixes. Solvent is now leased from a company which picks it up when used and recycles it. Previously the spent solvent had to be disposed of as hazardous waste. Another team of two suggested that a centrifugal unit be incorporated into the spray paint booth operation. The unit separates paint particles from the circulating water thus lengthening the time of use and significantly minimizing the amount of hazardous waste produced. Previously about twenty-one barrels of waste were produced; now only two are produced. The final winner was an individual who has implemented the use of washable rags and a citrus based solvent to replace flammable solvent and disposable paper towels. This approach eliminated a satellite storage area.

Documentation of Waste Management Process and Development of Cost Estimation Model

Michelle Burns
Lola M. Matysiak
Los Alamos National Laboratory

The Los Alamos Waste Management Cost Estimation Project was sponsored by the Waste Minimization Program Office at Los Alamos National Laboratory in an effort to better understand and control waste management costs and minimize the generation of waste. The four waste types that were evaluated in this model were hazardous, mixed, low level radioactive solid and transuranic wastes. The ultimate goal of this effort was to develop an estimate of the life cycle costs for the aforementioned waste types. To meet this goal, a model that can be used by waste generators or managers, the Cost Estimation Model was developed as a tool that can be used to calculate the costs of waste management at LANL for the aforementioned waste types, under several different scenarios. This simulation model is very flexible and can be altered to reflect changes in the waste management process or costs.

Each waste category at LANL is managed in a separate fashion, according to Department of Energy requirements and state and federal regulations. The cost of the waste management process for each waste category has not previously been well documented. In particular, the costs associated with the handling, treatment and storage of the wastes have not been well understood. It is anticipated that greater knowledge of these costs will encourage waste generators at the Laboratory to apply waste minimization techniques to current operations. Expected benefits of waste minimization are a reduction in waste volume, decrease in liability and lower waste management costs.

Plasma Technologies for Hazardous Material Reduction

H. Davis

We are developing two plasma-based technologies to reduce the use of hazardous materials:

Ion Plasma Source Ion Implantation (PSII)

PSII is an economical method of surface modification that improves the wear and corrosion resistance of industrial components and manufacturing tools. The implanted material is immersed in a plasma and pulse-biased to a high negative voltage. Ions from the plasma are accelerated and implanted into the surface, thereby improving resistance to wear. Compared to conventional implantation technology, this process provides a more uniform implant with higher throughput at lower cost. PSII extends the life of chrome-plated parts, thereby reducing the need for replating; in some cases, PSII may replace the chrome-plating process.

Plasma Dry Cleaning

This process uses an oxygen, radio-frequency plasma to remove hydrocarbon surface contaminants, such as cutting fluids, oils, and greases, from manufactured components, reducing the need for toxic solvents. The resultant byproducts are carbon dioxide and water vapor. Electron-impact in the plasma dissociates and ionizes the oxygen gas, and oxygen ions bombard the surface, breaking chemical bonds and creating reactive sites. Moreover, the plasma transports energy to the near-surface region, which assists in desorption and enhances chemical reactions.

Overview of Pollution Prevention Approach at Los Alamos

Micheline Devaurs

The LANL Pollution Prevention program is engaged in a transition from infrastructure and programmatic development to implementation actions required to address LANL waste reduction goals. The primary program elements are the base program, waste minimization implementation via special projects, and the charge-back program. Each element and how it contributes to LANL's action to pursue the site goal of 95% reduction in waste generation by FY 2000 will be discussed.

LNL's strategic action plan is aimed at reducing the quantities of priority waste forms, currently TRU and LLW, as determined by an integration of volume, cost, and risk. The priority waste types will be re-evaluated annually.

The LANL Waste Minimization/Pollution Prevention program will work with waste generators to identify opportunities for waste minimization/pollution prevention, conduct a return on investment (ROI), analysis of alternatives, and implement them on a priority basis. The approach to waste reduction implementation will include technical, economic, and operational feasibility studies for all waste minimization/pollution prevention implementation actions under consideration. LANL will seek expertise in waste minimization implementation, source reduction, and treatment of waste types, including radioactive waste, to assist LANL in achieving its waste reduction goals.

A LOW TEMPERATURE GAS-SOLID PROCESS FOR THE DESTRUCTION OF CHLOROCARBONS

An Abstract

Jerry Foropoulos, Jr.

Nuclear Materials Technology Division, Los Alamos National Laboratory

Chlorocarbons have been known for years as environmental and health hazards with several examples amongst the most commonly listed toxic and hazardous compounds. Government, industry, and the general public used chlorocarbons in great quantities as cleaning fluids, solvents, and fire extinguishing agents. Today, chlorocarbons are still widely used, but much more regulated. The challenge is to run processes and remediate existing contamination and waste storage problems involving chlorocarbons without causing additional pollution hazards. Technology which safely and economically addresses remediation and disposal problems along with pollution prevention is also highly desirable.

In a one-step reaction system, soda lime (a fused mixture CaO and NaOH in a coarse, granulated form) at 300°C to 400°C acts as an efficient hydrolyzing, degradation, and off-gas scrubbing agent. Within this medium, CO2 and HCI from the hydrolysis and degradation reaction convert immediately to calcium and sodium chlorides and carbonates, leaving water vapor as the main volatile byproduct.

This process, in converting volatile chlorocarbons to nonhazardous chloride salts, can apply to various processes and contaminant sources by preventing escape to the environment. It can be used as a stand-alone treatment method or with other proven technology.

The pollution prevention potential involving several chlorocarbons will be discussed as well as the application of this process to current needs.

Poster Exhibit for Pollution Prevention Program,
January 16-19, 1995

Roland Hagan, Charles L. Foxx

Title: P Project WAND (Waste Acceptance for Nonradioactive Disposal)

The potential for reduction in the volume of low-level radioactive waste currently disposed at TA-54, Area G, is estimated to be one thousand cubic meters per year or greater.

At the Los Alamos National Laboratory's Plutonium Facility, a demonstration pilot project is in progress to prove nonradioactivity of room trash which is generated and separated within a radioactive materials management area (RMMA). The project has five distinct parts: one, create a nonradioactive room trash waste stream in an RMMA; two, prove the trash is nonradioactive with ultra-low-level automated instrumentation; three, design National Institute of Science and Technology (NIST) traceable standards to assure system performance; four, perform computer modeling for public health Risk Assessment; five, using project performance data aid the Department of Energy (DOE) in setting release guidelines for disposal in a sanitary landfill.

Using Electrolytic Decontamination Methods for Pollution Prevention

T. O. Nelson, M. E. Huerta, L. Jaramillo, A. N. Morgan, H. E. Martinez, W. R. Romero, and L. H. Stapf
Los Alamos National Laboratory

Electrolytic decontamination of conductive materials offers several advantages over existing decontamination methods. Benefits include the ability to achieve waste minimization and recategorization (from a high to a low level), lower personnel exposure, and a more effortless compliance with policies and procedures. As a specific example, electrolytic methods use nonhazardous inert salts, as opposed to the concentrated acids that are used in common leach techniques. Additionally, decontamination of surfaces using electrolytic methods has an established technology base in electropolishing. We are investigating several applications of the electrolytic decontamination method, including the two described below.

We are developing an electrolytic glove box decontamination device that would work *in situ*. Decontamination of glove boxes, resulting in a recategorization from TRU waste to low level waste will result in a substantial savings in waste storage costs (≥$10 000 per box, which includes the cost of size reduction). Previous work at Battelle at Pacific Northwest Laboratories and EG&G Rocky Flats has readily shown decontamination of glove box material, including both swipable and fixed contamination. More specifically at EG&G Rocky Flats, fixed levels of contamination were readily decreased from 250 000 cpm to background with the electrolytic method.

Recent electrolytic work at Los Alamos National Laboratory has shown impressive decontamination of plutonium and americium from Oak Ridge enriched uranium (oralloy). Decontaminating oralloy parts down to 20 swipable disintegrations per minute/100 cm^2 reduces oralloy holdings and frees vault space by enabling these parts to be shipped to Oak Ridge. Electrolytic decontamination tests on removal of Pu/Am contaminated oralloy coupons have shown decreases in swipable contamination that initially ranged from 500 000 to 1 500 000 disintegrations per minute (dpm) down to 0¬2 dpm. Also, we have obtained superb electrolytic decontamination results of larger oralloy parts using a fixture.

A unique feature of the oralloy electrolytic process, using sodium nitrate as the electrolyte, is precipitate formation of contamination, which enables easy separation of the liquid electrolyte and the solid product contaminants. Thus , the same liquid electrolyte is used to decontaminate numerous parts. As a comparison, the electrolytic method waste volume is 1000 times lower than the waste volume generated by the previously used hot concentrated acid spray leach method.

High Explosive Wastewater Minimization Alternative

E. Hyde
Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) is under an EPA Administrative Order to treat all wastewater generated at high explosive (HE) processing facilities by September 1997. DOE has agreed to this requirement in the form of a Federal Facilities Compliance Agreement (FFCA). The treatment methods used to treat the HE wastewater are to ensure that all HE wastewater discharged to the environment through EPA permitted outfalls will meet current and future discharge permit requirements. A $6M line item construction project to install HE wastewater treatment capability at Los Alamos National Laboratory is currently in process. Completion of this project will bring the Laboratory into compliance with the EPA Administrative Order by September 1997. The Environmental Assessment and Title 1 design of the HE Wastewater Treatment Facility, which are currently in process, include investigations of both the proposed action for the project and newly introduced wastewater minimization alternatives.

The original scope, or "proposed action" of the line item project consisted of constructing two new HE wastewater treatment facilities at LANL, one at TA-9 and the other at TA-16. Underground pipe systems were to be installed to deliver wastewater from the major facilities at TA-9 and TA-16 to the treatment facility at each site. Small quantities of wastewater generated at the remaining TA-9 and TA-16 facilities, as well as TA-11, -22, and -40 facilities, were to be delivered by truck to the TA-16 treatment facility. The two treatment facilities combined would treat the current annual HE wastewater discharge of 12,000,000 gallons. Under this scope, 2 of the 17 outfalls would remain active and 15 would be eliminated.

As an alternative to the current scope of the line item HE wastewater treatment project, a "wastewater minimization" option has been developed. This alternative consists of replacing HE processing systems within facilities that generate wastewater with systems that either recirculate water or do not use water. The wastewater minimization option will reduce the amount of HE wastewater generated from 12,000,000 gallons per year to 130,000 gallons per year, a reduction of approximately 99%. In addition to providing water conservation, the wastewater minimization efforts will eliminate the introduction into wastewater of organic solvents that would require treatment by using solvent recovery mechanisms.

A change proposal to the original project scope is in process that will recommend funding be diverted to specified wastewater minimization projects within HE processing facilities. A single, smaller, HE wastewater treatment facility will be constructed at TA-16. The underground pipeline collection systems at TA-9, TA-16, and the TA-9 treatment facility would be eliminated from the project. It is anticipated that the elimination of the underground piping collection systems and TA-9 treatment facility, along with the reduced size of the TA-16 treatment facility, will provide a net cost savings to the line item project.

Abstract for Pollution Prevention Showcase

Nitric and Hydrochloric Acid Recovery and Recycle

T. R. Mills, W. A. Punjak, L. D. Schulte, C. A. Smith, W. B. Smith, W. D. Smyth, S. B. Schreiber, and S. L Yarbro

Separation processes will be developed to demonstrate nitric and hydrochloric acid recycle in the Los Alamos Plutonium Facility. Acids will be removed from waste liquid streams to levels meeting or exceeding federal and state regulations on liquid effluents. Recycle acid will be reconcentrated sufficiently to be used for dissolution, etc., in lieu of makeup acid. In addition to removal of acids in liquid waste, radioactivity will also be lowered by several orders of magnitude.

Separations will be done utilizing evaporation of acid solutions, followed by either distillation or vapor-phase membrane separation to yield an extremely low-acid stream for disposal and a concentrated acid for recycle. The project includes development, construction, and testing of process systems for the demonstration. A nitric acid test distillation column, a hydrochloric acid test evaporator, and a hydrochloric acid vapor-phase membrane separator will be tested experimentally to individually demonstrate facets of acid recycle. Full-scale systems will be installed to implement these processes. This work builds upon existing capabilities at Los Alamos for evaporating radioactive acid solutions in a glove box environment.

ULISSES
Uranium Line for Special Separation Science

Jon B. Nielsen, MST-S
Los Alamos National Laboratory
Materials Science and Technology Division

Generating toxic and hazardous wastes presents a number of problems for industry, including high costs, worker safety, and associated spending such as treating, handling, and storing wastes. The ULISSES Project will use advanced technologies to demonstrate the highest standards of flexibility, worker protection, waste minimization and recovery, environmental protection, and safeguards of nuclear material. The processing line will include advanced dissolution chemistry and separations efforts to minimize secondary waste by using environmentally benign chemicals. We will focus on this technology base to develop, design, and demonstrate advanced chemical processing technologies that minimize waste.

PORTABLE METAL/TRITIUM RECLAMATION UNIT

Louise O'Brien

LOS ALAMOS NATIONAL LABORATORY

ABSTRACT

The safe disposal of material, equipment, and even entire facilities contaminated by tritium during the manufacture of nuclear weapons is a serious problem for the Department of Energy (DOE). Many years of handling, processing, and storing tritium has created considerable quantities of metal (steel and stainless steel) contaminated with tritium. We propose to use existing technology to construct a portable unit that separates tritium and other gases from the metal, strips the tritium from those gasses and provides tritium and metal for recycle.

Waste Minimization for Photographic Process E-6

P. Salaz

Los Alamos National Laboratory group CIC-9 corrected an unexpected overgeneration of photographic chemical waste for process E-6. The group used Continuous Quality Improvement (CQI) and formed a process action team (PAT) as a basis for problem solving. The CQI process benefited both the PAT and CIC-9, and the team effort produced cost savings.

Poster Exhibit for Pollution Prevention Program,
January 16-19, 1995

Submitted by Francine Seal

Johnson Controls World Services Communications Department

Good Neighbors Across the Bridge

Johnson Controls World Services (JCI) has a very proactive program addressing Waste Minimization and Pollution Prevention. As part of the public information component of the program JCI produced a 22-minute videotape illustrating specific waste minimization projects which it implemented to reduce or eliminate waste and prevent pollution. Featured projects include CFC recycling, used oil recycling, white paper recycling, substitutions for hazardous materials, the elimination of a hazardous waste satellite storage area and other projects.

The video was shot on location at facilities housing JCI operations in Los Alamos using the actual people who suggested or implemented the waste minimization projects. Spectacular vistas are included. While the script was written in-house, JCI contracted for the services of the local public access television station (PAC-8) for assistance in producing and editing the tape.

The video was planned as a community relations tool to show the Los Alamos community what JCI in partnership with the Los Alamos National Laboratory, is doing in the waste minimization and pollution prevention fields. The video also serves as a showcase for JCI to encourage its employees to minimize waste and to continuously develop and implement new waste minimization and pollution prevention projects.

Chlorofluorocarbon Use and Future Elimination Plans at Los Alamos National Laboratory

T. Siverling
Los Alamos National Laboratory

The purpose of this study of chlorofluorocarbons (CFCs) is to formulate future recommendations regarding the use and elimination of CFCs at Los Alamos National Laboratory (LANL). This study will be accomplished by reviewing past and current legislation that bans CFC production and some CFC uses, and past and current LANL refrigerant management policies. With this review, the following conclusions will be confirmed: replacement or conversion of five chillers per year over the next four fiscal years to reduce CFCs at LANL by 50%. In implementing this plan, LANL will meet the requirements of Executive Order 12843, Title VI of the Clean Air Act, the Montreal Protocol, Title 40 of the Federal Regulations (40 CFR 82), Department of Energy Order 5400.1, and the Refrigerant Recycling Rule as given in 58 FR 28660. Additionally, it is recommended that the use of Halon 1301 be eliminated in fire suppression systems in accordance with Title VI of the Clean Air Act and 40 CFR 82. Finally, these recommendations will become part of the LANL In House Energy Management (IHEM)integrated building project for the Administration Building.

Abstract for LANL Pollution Prevention Showcase
January 16-18, 1995

Environmentally Friendly Metal Cleaning

Jay Stimmel
Principal Investigator - Heat Treating Network Project
Los Alamos National Laboratory
DX-16
MS C920
667-4932

Small businesses in the United States are being severely impacted by the pending Montreal Protocol deadlines for the elimination of CFCs. Los Alamos National Laboratory is currently assisting the Heat Treating Network, a trade association of small businesses which heat treat metals, with the transition to more environmentally friendly cleaners. We are using an integrated approach to examine the entire process from suppliers to finished product. The results of this project are applicable to other small businesses involved in metal cleaning.

WASTE MINIMIZATION IN THE LOS ALAMOS MEDICAL RADIOISOTOPE PROGRAM

W. A. Taylor, D. J amriska, V. T. Hamilton, R. C. Heaton,
D. R. Phillips, R. C. Staroski, J. B. Garcia, J. G. Garcia, M. A. Ott

Los Alamos National Laboratory, P. O. Box 1663
Los Alamos NM 87545 USA

ABSTRACT

Since the mid-1970s, the Los Alamos Medical Radioisotope Program has been irradiating target materials to produce and recover radioisotopes for applications in medicine, environmental science, biology, physics, materials research, and other disciplines where radiotracers find utility. By necessity, the chemical processing of targets and the isolation of radioisotopes generates radioactive waste materials. There have been in recent years federal mandates requiring us to discontinue the use of hazardous materials and to minimize radioactive waste volumes. As a result, substantial waste reduction measures have been introduced at the irradiation facility, in processing approaches, and even in the ways the product isotopes are supplied to users.

Shredding of Low-Level Waste at the Los Alamos National Laboratory Plutonium Facility —A Feasibility Study

Mike H. West, MST-5, and Gene M. Jacques, NMT-2
Los Alamos National Laboratory

Groups at the Los Alamos National Laboratory Plutonium Facility (TA-55) are evaluating methods for minimizing the ***volume*** of low-level waste (<100 nCi/g) sent for burial at the TA-54 landfill. The Plutonium Facility is the source of much of the low-level waste at the Laboratory. Space at the landfill is limited, and the allocation of additional space must be approved by the state of New Mexico. One such alternative involves shredding the contents of the low-level waste container, a 1' x 1' x 2' cardboard box, with a commercially available shredder, e.g., the Allegheny Model BC-30. Experiments, performed at Allegheny Paper Shredders Corporation on simulated Plutonium Facility room trash, suggest a potential ***50 volume percent reduction*** in materials introduced to the TA-54 landfill by the use of commercial shredders. The effort to study the feasibility of low-level waste shredding is discussed in the body of the presentation .

Design of a Novel Diamond Indentor to Aid in the Study of Surface Films Associated with Wear Prevention

Curtis Westerfield and Stephen Agnew

Abstract:

We have developed a novel diamond indentor which permits surface films to be studied with FTIR or Raman spectroscopy under conditions associated with wear. Changes observed in the spectra of the surface films can be directly related to changes in the chemistry or phase of the molecules which make up the film. These observations will lead to a better understanding of wear mechanisms which in turn will lead to the development of improved protective films. This cell can be used for a variety of applications such as to provide a better understanding of boundary lubrication, to determine the nature of strain and surface cohesive forces of diamond films under load and in the prescience of shear, or to determine mechanisms of chemically assisted machining of ceramics. Because wear plays such a prominent role in the generation of pollution from the disposal of worn parts or lubricants to the increased emissions from worn engines, we believe that even a small contribution to decreasing wear will have a large impact on reducing pollution and improving the environment.

MAGNETIC SEPARATION FOR WASTE MINIMIZATION

Laura A. Worl, Dallas D. Hill, Dennis D. Padilla,
F. Coyne Prenger, David A. Romero, Ann R. Schake
Los Alamos National Laboratory

Thomas L. Tolt
Lockheed Environmental Systems and Technologies Company

High gradient magnetic separation (HGMS) is a form of magnetic separation which can be applied to the separation of solids from other solids, liquids, or gases. Unlike ferromagnetic (strongly magnetic) separation methods, HGMS is generally used to separate paramagnetic (slightly magnetic) materials from diamagnetic (non magnetic) materials. Because most actinide compounds, fission products and heavy metals are paramagnetic, HGMS can be used to concentrate these toxic materials into a low volume waste stream. We are exploring the extraction of paramagnetic particles in applications such as soil remediation, wastewater treatment, and plutonium and uranium processing waste streams.

Application of HGMS usually involves passing a slurry of the contaminated mixture through a magnetized volume. Field gradients are produced in the magnetized volume by a ferromagnetic matrix material such as steel wool or iron shot. Ferromagnetic and paramagnetic particles are extracted from the slurry by the ferromagnetic matrix while the diamagnetic fraction passes through the magnetized volume. The magnetic fraction is flushed from the matrix later when the magnetic field is reduced to zero or the matrix is removed from the magnetized volume. The paramagnetic concentrate can then be processed for disposal or recycling.

HGMS tests have successfully been performed at Los Alamos National Laboratory using radioactive soil samples, contaminated wastewater, and colloidal solutions. In studies involving soil remediation we are developing and testing HGMS as part of a cooperative research and development agreement (CRADA) with Lockheed Environmental Systems & Technologies, Inc. (LESAT) and as part of the Heavy Metals in Soils I.D. Preliminary results from HGMS on plutonium and uranium contaminated soils indicate that up to 80% of the actinides can be removed from these residues.

Results from screening experiments on contaminated wastewater indicate that >99.9% extraction of Pu activity can be achieved using HGMS. This represents decontamination levels of three orders of magnitude to about 10 pCi/L (22.2 dpm/L). The wastewater used in this screening study had been stored in a holding tank for 3-6 months prior to HGMS testing. When a raw influent was collected on the same day as HGMS treatment, up to 99% of the Pu activity was removed. These results represent 2-3 orders of magnitude decontamination to <500 pCi/L (about 103 dpm/L).

The ATLAS Facility: A Tool for Waste Management

Stephen L. Yarbro, S. B. Schreiber, and W. A. Punjak

The Advanced Testing Line for Actinide Separations (ATLAS) is a pilot plant of all aqueous nitrate plutonium recovery and purification operations within the Los Alamos Plutonium Facility. The main unit operations include dissolution, anion exchange, precipitation, evaporation, calcination, and waste stream polishing. In the current political environment, our emphasis has been redirected from the traditional goal of recovering a pure plutonium product to that of generating “clean” effluents while placing the plutonium into a form suitable for long term storage. The ATLAS facility is uniquely suited to fulfill this new role in the development and demonstration of new or revisited technologies. It is a valuable waste management tool in the remediation of the “plutonium problem.

LALP-94-167

Los Alamos
NATIONAL LABORATORY
Los Alamos, New Mexico 87545